URSI/IAGA Joint Working Group on VERSIM (VLF/ELF Remote Sensing of the Ionosphere and Magnetosphere)

Business meeting - 19 August 2002

There was a meeting of the VERSIM working group during the URSI General Assembly, Maastricht, at 1800 on Monday 19 August 2002.

Present: AJ Smith (UK) in the chair, D Carpenter (USA), M Clilverd (UK), A Collier (South Africa), Y Hobara (France), J Manninen (Finland), A Nickolaenko (Ukraine), D Nunn (UK), A Oikarinen (Finland), M Parrot (France), T Raita (Finland), S Shimakura (Japan), O Soloviev (Russia), NR Thomson (New Zealand), T Ushio (Japan).

Chairman's Report:
Andy Smith (the IAGA co-chairman), on behalf of the working group, congratulated Don Carpenter of Stanford University, the first chairman of the working group, on being awarded the Dellinger Gold Medal the previous day. He then summarised the activities of the working group since the previous URSI General Assembly in 1999, held at Toronto.

Future of the working group:
It was unanimously agreed to recommend that the working group continue in existence for the next triennium (2002-2005), and that Michel Parrot continue as URSI co-chairman.

Reports from VERSIM research groups:

France. Michel Parrot reported that LPCE is involved in three projects of micro-satellite in order to study the Earth's environment:

DEMETER is devoted to the study of ionospheric perturbations in relation to seismic activity and anthropogenic activity. The launch is expected in March 2004 and the duration of the mission will be two years. It is a low-altitude (750 km) and polar micro-satellite with a payload composed of experiments to measure wave and plasma parameters. Co-operation with ground-based experiments will be done and scientists are encouraged to propose coordinated active experiments.

PROBA 2 is an ESA micro-satellite. LPCE will provide the MWF (Magnetic Wave Field) experiment. The objectives of the MWF instruments are : (i) to characterise the waves associated with the accelerated and/or precipitated electrons, (ii) to look for electromagnetic signatures of the radiation effects, (iii) to test equipment to be launched on recurrent satellites in order to create the statistical data bases needed to elaborate a wave model to be entered into physical radiation belt models. If for the first two objectives one may consider that MWF provides environmental data for the radiation instruments, the third objective is a proper one. The elaboration of physical radiation models is one of the primary goals for a Space Weather programme. Indeed, operational radiation belt models are presently missing both: for testing the electronic components before the launch, and for predicting the flux of electrons which may impact a spacecraft. A wave model is a key element in a radiation belt model. Data

bases will be constructed from each type of emission which might be involved in the acceleration and/or precipitation of energetic electrons (VLF ground-based transmitters, chorus, hiss, magnetosonic waves, ion cyclotron waves). They will contain the power spectral density of the observed magnetic wave fields in the frequency range 1 Hz to 25 kHz and propagation characteristics (propagation mode, degree of polarisation, wave normal direction) at 256 different frequencies.

TARANIS is a CNES micro-satellite with a platform identical to DEMETER. The TARANIS (Tool for the Analysis of RAdiations from lightNIngs and Sprites) project will be devoted to the study of atmosphere-ionosphere-magnetosphere coupling during thunderstorm activity. The study will be done for local and global scales in order to understand the physical mechanisms responsible for the impulsive transfer of energy between the neutral atmosphere and the ionospheric and magnetospheric plasmas. The final goal is to determine the impact of these processes on the Earth's environment. LPCE will provide the wave experiment

USA. Don Carpenter said that some interesting new results (to be reported elsewhere at the conference) were coming out of the RPI experiment on IMAGE, including discrete spectrogram traces corresponding to field line guiding and spread echoes from the plasmapause indicting density structures near the surface. 125ms transmissions were ongoing in a collaboration with Craig Rodger. During the December 2001 campaign aimed at looking for whistler mode propagation to the ground, using 375ms pulses at VLF frequencies 5 – 15 kHz, no signals had been reported to be observed, though they had been received on CLUSTER. Andy Smith commented that the records from Halley made during the campaign had been scanned for the IMAGE transmissions, but that the satellite was not in an ideal location because the VLF transmissions were replaced by higher frequency transmissions intended for South Pole before the satellite approached Halley near perigee. Don responded that there may be another similar campaign organised, modified to address this problem. He also commented that since IMAGE had received a 2 year extension, it should overlap with DEMETER.

Ukraine. Sasha Nickolaenko commented that it was the 50th anniversary of the discovery of Schumann resonances, and that a session was to be held later in the week on this theme.

Finland. Jyrki Manninen introduced the LAPBIAT scheme (Lapland Atmosphere-Biosphere Facility). Funds are available to support scientific research and collaboration in Lapland. Full details are on the Sodankylä Geophysical Observatory website.

Jyrki also reported on a plan to hold a specialised meeting on *ELF/VLF phenomena* in Finland in September 2004. The venue would be Sodankylä Geophysical Observatory. URSI sponsorship (non-financial) would be sought via the Commission H Business meeting later in the week.

UK. Andy Smith summarised the current VLF/ELF observations being made by British Antarctic Survey, at Halley and Rothera stations. The trimpi experiment at Halley was turned off at the end of 2001 but the other recordings were continuing. Future plans included the decommissioning of the Automatic Geophysical

Observatories between Halley and South Pole, and completion of the new global network, VELOXnet, to cover all local times at every UT. A dedicated narrowband receiver at Halley was ready to receive transmissions from the South Pole VLF beacon at about 20 kHz. The beacon is due to being operating in late 2002/ early 2003.

Symposia at future IAGA and URSI Assemblies

IAGA, Sapporo, 30 June - 11 July 2003
The session GAIII.10 *Waves as diagnostic probes for space weather studies* will include ULF, ELF and VLF observations and theory, and both space-based and ground-based studies. It will thus cover many of the interests of the VERSIM group. The conveners are K Yumoto, A J Smith and F Menk.

URSI, New Delhi, October 2005
It was proposed from the floor that there should be a session on "ULF, ELF, and VLF impacts on the radiation belts" with possible conveners Rodger (New Zealand), Heynderickx (Belgium) and Fraser (Australia). This was endorsed by the meeting and would be presented to the G/H Business meeting later in the week. [Note added later: It was approved as a G/H session for 2005 with the addition of Horne (UK) as another convener).]